CONTROVERSIAL PARK ISSUES

6

Bioprospecting & Benefits-Sharing

The Issue
Should the potential scientific and economic benefits resulting from collaboration with private scientific industries be used to support and strengthen the National Park Service's primary mission of resource conservation?

Definitions
Bioprospecting is the search for useful organic compounds in nature.
Benefits–sharing is an agreement between researchers, their institutions, and the National Park Service that returns benefits to the parks when results of research have potential for commercial development.

History
1966: the microorganism *Thermus aquaticus* was discovered in a Yellowstone hot spring.
1985: an enzyme from *T. aquaticus,* which is now synthesized, contributed to a popular DNA fingerprinting process that has earned hundreds of millions of dollars for the patent holder.
1997: the park signed a benefits-sharing agreement with Diversa Corporation of California, which ensures a portion of future profits will go toward park resource preservation.
1999: a legal challenge put a hold on implementing this agreement until an environmental analysis (EA or EIS) is completed.

Current Status
- NPS will be conducting an environmental analysis (EA or EIS) to decide whether benefits-sharing should be a part of NPS policy for parks.
- More than 50 permits have been granted to scientists, organizations,and companies to study microbes in Yellowstone.Regulations governing these permits provide that the research project may be authorized only if it is appropriate in Yellowstone. By law, appropriate projects must not impair natural or cultural resources or visitor use and enjoyment of the park.
- Research microbiologists continue to find micro-organisms in Yellowstone that provide insights into evolution, aid in the search for life on other planets, and reveal how elements are cycled through ecosystems.

When you look into Yellowstone's deep and colorful thermal pools, it is as though you are looking through a window into the earth's past to the beginnings of life itself. The original atmosphere of the earth was so anoxic (without oxygen) that it would not support human life. The brightly colored bacteria that form the yellow, orange, and green mats found in and around the hot springs were the among the first organisms capable of photosynthesis—the process by which plants use sunlight to convert carbon dioxide to oxygen and other byproducts. In this way, these colorful lifeforms, called cyanobacteria, began to create an atmosphere that would eventually support human life.

History

Careful scientific study of these curious lifeforms began in earnest in 1966, when Dr. Thomas Brock discovered a way to grow one of the microorganisms that lived in the extraordinary hot waters (more than 70ºC) of Mushroom Pool in the Lower Geyser Basin. This bacterium, *Thermus aquaticus,* proved essential to one of the most exciting discoveries in the 20th century. (See photo on page 103.)

Two decades ago, the study of DNA was barely possible. Things we take for granted today such as DNA fingerprinting to identify criminals, DNA medical diagnoses, DNA-based studies of nature, and genetic engineering were unimaginable. But in 1985, the polymerase chain reaction (PCR) was invented. PCR is an artificial technique for something that living things do every day—replicate DNA. PCR is the rocket ship of replication, since it allows scientists to multiply a piece of DNA billions of times in a few hours. Without PCR, scientists could not get enough DNA to work with. An enzyme discovered in *T. aquaticus* (called Taq polymerase) made PCR practical. Because it came from a thermophile (heat-loving organism), Taq polymerase can withstand the heat of the PCR process without breaking down like ordinary polymerase enzymes. Use of an enzyme discovered in *T. aquaticus* and now made in a laboratory suddenly allowed genetic studies to be practical and affordable.

Many other species of microbes have been found in Yellowstone since 1966. Each of Yellowstone's thermophiles produces thousands of uncommon, heat-stable proteins. Researchers estimate that more than 99 percent of the species actually present in Yellowstone's thermal features have yet to be identified.

Science

Because much of modern biotechnology is based on the use of enzyme catalysts for biochemical reactions—including genetic engineering, fermentation, and bioproduction of antibiotics—these heat-stable

proteins are becoming increasingly important in the advancement of science, medicine, and industry. Yellowstone preserves one of the planet's greatest concentrations of thermophilic biological diversity and, thus, is a strategic repository of unique genetic resources.

Yellowstone's geology provides a variety of physical and chemical habitats that support a wide spectrum of early life forms. Hot springs with pH readings ranging from 2 to 10 are typical, and they have geochemical substrates ranging from igneous and metamorphic to sedimentary. According to DNA sequencing analysis, the organism most closely related to the primordial origin of life—the earth's most primitive species—resides in a mineral spring in Hayden Valley. It is a member of the domain *Archaea* and for now is known as PjP78.

These researchers are working cautiously in a very fragile and dangerous place. All scientists in Yellowstone work under special permits and are closely supervised by Yellowstone's staff.

Ongoing Research

More than 50 research studies are being done on microorganisms from the park today. For example, NASA is studying thermophiles that might help determine if life exists on Mars. Cyanobacteria that influence the growth of hot springs terraces impart a biogeochemical signature that can be seen from overhead satellite imagery. Scientists are searching this imagery for the same signature in Mars' ancient volcanoes and suspected hot springs. Other microbes have been found that are useful in producing ethanol, treating agricultural food waste, bioremediating chlorinated hydrocarbons, recovering oil, biobleaching paper pulp, improving animal feed, increasing juice yield from fruits, improving detergents, and a host of other processes.

Controversy

Along with this exciting new dimension to the park and to science, some questions have been raised about whether or not bioprospecting of microbes should be allowed in the park. Long-standing laws and regulations instruct parks to allow scientific research as long as it does no harm to park resources or values. Park managers do not allow "extraction" of microbes beyond the tiny samples required for scientific analysis. In addition, bioprospectors are not the only ones who may get ideas from their research that can be applied to commercial uses. Any Yellowstone scientist may accidentally learn something that leads to a commercial success. Nonetheless, some people question the appropriateness of allowing scientists to perform research in a national park if they are avowed bioprospectors even if they are looking for a way to reduce greenhouse gas emissions or cure cancer.

Benefits-Sharing

The issue of benefits-sharing from approved research projects with bioprospecting outcomes came to the forefront when Yellowstone recognized that the development of the polymerase chain reaction (PCR) had resulted in a multimillion dollar business.

Hoffman–La Roche, a Swiss pharmaceutical company, purchased the U.S. patents for the PCR process and Taq polymerase from Cetus Corporation in 1991 for an alleged $300 million. Since then, PCR has become one of the cornerstones of modern medical diagnostics, and annual sales of Taq polymerase have grown to several million. Yellowstone National Park and the United States public have received nothing from this commercial use of a product developed using science based upon a Yellowstone resource. Hoffman–La Roche and the researchers acted lawfully throughout the development and sales of Taq polymerase. At issue is whether the NPS should insist that research institutions and companies share any benefits they may acquire from their scientists' research results or whether the NPS should relinquish any claim to a portion of such benefits.

Research Agreements

In 1997, Yellowstone National Park became the first national park to an agreement called a Cooperative Research and Development Agreement (CRADA). Other federal agencies, including the National Institutes of Health and the Department of Energy have used CRADAs for years to conduct collaborative research and development with private researchers, consistent with each agency's mission. At Yellowstone, these agreements allow the park to collaborate with researchers and receive equitable benefits, such as equipment, research, or funding for conservation projects, when research on biological material

from the park leads to commercially successful inventions. Similar benefits-sharing agreements are increasingly used in other countries to protect biodiversity by allowing the host nation to benefit from commercial discoveries that depended on its national parks and other protected areas.

Under this particular CRADA, Diversa Corporation would pay the park $25,000 each year for five years and, if profits result from research on Yellowstone microbes, royalty payments. The up-front payment would be creditable against any royalties Diversa might owe Yellowstone, so additional royalty payments would not be received by the park until the up-front amount had been exceeded. The agreement did not enable Diversa to do anything that was not already allowed under the NPS research permit system; it simply provided compensation to the park for collaborative assistance provided by park personnel and for the preservation of the microbial habitat.

Diversa, which also has research sites in Costa Rica, Iceland, Antarctica, and at the bottom of the Pacific and Atlantic oceans, collects DNA from thermal habitats and screens the genes for the ability to produce useful compounds such as enzymes. They genetically engineer the most useful genes into "microbial livestock" for commercial production of the compound or enzyme. As with all NPS research specimens, the Yellowstone microbes themselves remain in federal ownership. None of Yellowstone's natural resources are ever sold. Research specimens used by all bioprospectors remain federal property.

Into Court

Four entities, including two organizations opposed to biotechnology and an environmental group, sued the National Park Service in 1998, alleging the agreement was a commercialization of public resources without public input. In April 2000 the judge ruled with prejudice against them but let stand a previous order requiring the National Park Service to complete an environmental analysis of the impacts of the agreement according to National Environmental Policy Act procedures. The CRADA between Diversa and Yellowstone is suspended until such an analysis has been completed.

As global biodiversity declines, national parks and other preserves become increasingly important as sources of genetic diversity for scientific study as well as products that may benefit humanity. More than 40 percent of the medicines in use today are based on natural products derived from individual plant species. The bioprospecting agreement initiated by the National Park Service is a tangible demonstration of the value of preserving biodiversity for the secrets they may reveal in the future.

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Thermus aquaticus

6

Issues: Bison Management

The Issue

About half of Yellowstone's bison test positive for exposure to brucellosis, a disease that can cause susceptible domestic cattle to abort their first calf. Because Yellowstone bison migrate into Montana, their exposure to brucellosis concerns the cattle industry in that state.

History/Background

- Bison probably contracted the disease from domestic cattle that were raised in the park to provide milk and meat for park visitors in the early 1900s.
- Brucellosis has had no apparent impact on the health of the bison population.
- Cattle contract the disease by coming in contact with infected tissue and birth fluids of other cattle.
- The human form of the disease, called undulant fever, was once a public health threat but is no longer.
- An effective brucellosis vaccine for cattle (strain 19) provides little protection for bison. Another vaccine used in cattle,RB51, is still being studied for its potential use in bison.
- No cases exist of wild, free-ranging Yellowstone bison transmitting brucellosis to cattle.
- The State of Montana, like other states, has spent much time, effort, and money attempting to eradicate brucellosis in cattle.
- Elk also carry brucellosis.

Current Status

In December 2000, the federal government and the state of Montana released Records of Decision that, while separate documents, support essentially the same management plan for bison.

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About Brucellosis

Brucellosis, caused by the bacterium *Brucella abortus,* can cause pregnant cattle to abort their calves. The disease is transmitted primarily when non-infected, susceptible animals come into direct contact with infected birth material. No cure exists for brucellosis. According to recent research, however, a vaccine (RB51) used in cattle can be used in bison calves and yearlings.

Although rare, humans can contract brucellosis (through unpasteurized, infected milk products or contact with infected birth tissue) and develop a disease called undulant fever. With milk pasteurization, which is required by law, humans have virtually no risk of contracting the disease. And if they do, antibiotics can treat the disease.

Brucellosis was discovered in Yellowstone bison in 1917. They probably contracted the disease from domestic cattle raised in the park to provide milk and meat for visitors staying at the hotels. Now about 50 percent of the park's bison test positive for exposure to the brucella organism. However, testing positive for exposure (seropositive) does not mean the animal is infected with the disease and capable of transmitting brucellosis. (For example, adult humans who receive a smallpox immunization shot during their childhood will test positive for antibodies to smallpox even though they are not infected with the disease and cannot transmit it.) Research reported in 1999 indicates only 4.6 percent of seropositive female bison actually carry *Brucella abortus*. It has never been documented that wild bison can transmit the disease to domestic cattle under natural conditions, although this has been achieved under laboratory conditions.

Many other issues about brucellosis are not yet fully resolved. Scientific data on brucellosis in cattle may not necessarily apply to bison. Likewise, the disease may manifest itself differently in the two species. For example, a recent review of published and unpublished data shows that infected bison differ from infected cattle in the way they respond to vaccines, and even standard testing for the disease. Until additional research is completed on wild bison, understanding of the bison host/brucella organism relationship will remain limited.

Elk in the Greater Yellowstone Ecosystem also test positive for the brucella organism, and this reservoir for the disease might be able to reinfect a bison herd. A variety of research projects are currently underway to examine these questions.

Cattle–Bison Conflicts

Federal and state agencies and the livestock industry have spent much time and money to eradicate brucellosis from cattle. States that have accomplished this task are given a status of "brucellosis class-free" and are able to export livestock without restrictions

and costly testing. Montana received this status in 1985.

Brucellosis infections in Montana cattle herds can threaten the state's status and the finances of the rancher involved. When a single cow in a livestock herd becomes infected with brucellosis, the entire herd is quarantined and slaughtered. Federal and state indemnity funds partially compensate the livestock producer for this loss. If the disease spreads to another livestock herd or if a herd is found to be infected and the state does not address the problem, the state could lose its brucellosis class-free status. Such a loss could be costly to Montana livestock producers.

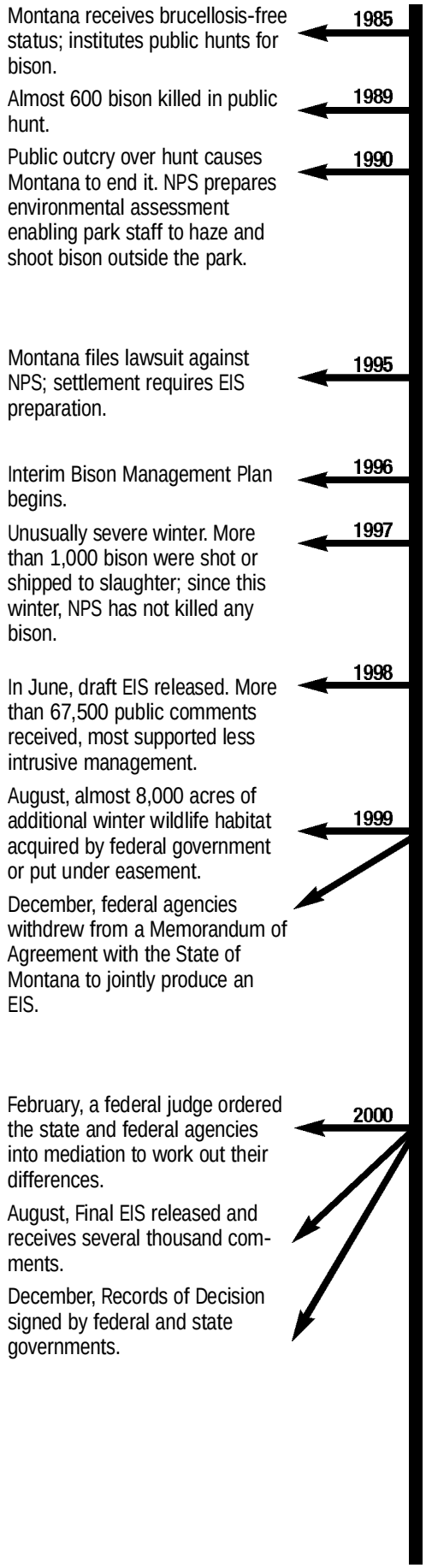
To protect cattle from brucellosis, ranchers vaccinate the animals. Approximately 95 percent of cattle grazing in the Yellowstone area during summer are vaccinated; under the new management plan, described below, 100 percent will be vaccinated. A safe and effective brucellosis vaccine has not yet been developed for wildlife.

The state of Montana believes that its brucellosis class-free status is threatened by bison migrating out of the park, and they have wanted bison to be subjected to the same management protocols as livestock in order to achieve the goal of brucellosis eradication. Others believe that brucellosis eradication is not possible in wildlife, and that bison and livestock can be managed in ways to reduce the risks of transmission.

Recent History

In 1985, Montana initiated a public hunt as the method to control bison migrating from Yellowstone National Park to areas along the north boundary near Reese Creek and areas along the west boundary near West Yellowstone. The control hunts continued each year with little notice until the severe winter following the fires of 1988 when 569 bison were killed. The resultant nationwide public controversy about the hunt caused the Montana Legislature to rescind authorization for the hunt.

Beginning in 1990, while Montana and the federal agencies were preparing a long-term plan, Montana needed an interim management plan to protect private property, to provide for human safety, and to protect the state's brucellosis class-free status. NPS complied with an environmental assessment



(EA) that provided for limited NPS management of bison through hazing and monitoring, and shooting outside of park boundaries at the request and under the authority of the Montana Department of Fish, Wildlife and Parks. In 1992, the State of Montana entered into an agreement with NPS, the U.S. Department of Agriculture (USDA) Forest Service (USFS) and the USDA Animal Protection Health Inspection Service (APHIS) to develop a long-term management plan and environmental impact statement (EIS) for managing bison migrating from Yellowstone into Montana.

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Public hearings on the draft EIS were held around the country. The last one, held in Minneapolis,was preceded by a public rally organized by area tribes.

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Lawsuit Filed

In January 1995, the state of Montana filed a lawsuit against NPS and APHIS because it believed the federal agencies were not doing enough to protect the state from losing its brucellosis-free status. In the settlement, APHIS agreed that it would not downgrade Montana's brucellosis class-free status based on the presence of exposed bison migrating from Yellowstone into Montana as long as certain actions were taken, including completing another Interim Bison Management Plan.

The Interim Management Plan

The new plan called for NPS to build a facility to capture bison inside Yellowstone National Park at Stephens Creek, along the northern boundary. All bison captured in the facility would be shipped to slaughter. Any bison migrating north of the park into the Eagle Creek/Bear Creek area (east of the Yellowstone River) would be monitored and not captured. The Montana Department of Livestock (which, in 1995, had been given state authority to manage bison in Montana) was to capture all bison migrating out of the park at West Yellowstone and test them for brucellosis. All seropositive bison and seronegative pregnant females would be sent to slaughter. Other seronegative bison were to be released on public land. At their discretion, Montana could shoot any untested bison in the West Yellowstone area.

The new Interim Bison Management Plan began during the winter of 1996–97, the most severe winter since the 1940s. Large numbers of bison migrated out the north and west boundaries. By the end of the winter, 1,084 bison had been shot or sent to slaughter. Public outcry was much louder than in 1989.

The winter of 1997–98 was mild, and the state of Montana shot only 11 bison on the west side of the park, and no bison exited the park in the Stephens Creek area. The winter of 1998–99 was also mild, but in April, 94 bison were shipped to slaughter or died during capture operations from the western boundary area of the park. In 1999–2000, no bison were killed.

Draft EIS Released

The draft long-term bison management plan and EIS was released to the public in June 1998. The state was a lead agency along with the NPS and the U.S. Forest Service. APHIS was a cooperating agency. As with any EIS, lead agencies must come to agreement on the alternatives presented and analyzed. In this case, the management objectives of the federal agencies and the state complicated the process.

Seven alternatives with a full range of management techniques were presented for maintaining a wild, free-ranging bison population and minimizing the risk of transmitting the disease brucellosis from bison to domestic cattle on public and private lands in Montana. The alternatives ranged from capturing all bison that leave the park and sending those that test positive to slaughter, to the use of public hunting to control bison, to establishing tolerance zones outside the park boundaries.

The plan received more than 67,500 public comments, the majority of which favored an alternative plan that emphasized protection of bison. Subsequently, the federal agencies developed a modified preferred

alternative that minimized the risk of transmission of brucellosis from bison to cattle, worked towards the eradication of brucellosis from the bison herd, and decreased the unnecessary killing of bison.

The Final EIS and Management Plan

During development of the final EIS, further conflicts arose between the lead agencies. The State of Montana was concerned that other states would impose testing requirements on cattle that would increase costs for livestock producers. Montana also wanted all bison to be vaccinated immediately, although no safe vaccine has been found for pregnant female bison, the vaccine effectiveness has not been determined, and a safe and effective delivery method currently does not exist. Montana was also unwilling to allow seronegative pregnant bison outside park boundaries.

The lead agencies reached an impasse and in December 1999, the federal agencies withdrew from a Memorandum of Agreement with the State of Montana to jointly produce an EIS. The State challenged this action and a federal judge upheld the federal agencies' withdrawal from the MOU in February 2000. Before formal dismissal of the lawsuit, the state and federal agencies agreed to work out their differences using a court-appointed mediator to facilitate the process beginning in late April 2000. That mediation process lasted until early December 2000.

In August 2000, the *Final Environmental Impact Statement for the Interagency Bison Management Plan for the State of Montana and Yellowstone National Park* was released. After a public comment period, which lasted until mid October, the final management plan was further refined in consultation with the State of Montana and is a slightly altered version of the federal agencies'modified preferred alternative presented in the FEIS. In December 2000, the federal government and the state of Montana released Records of Decision that, while separate documents, support essentially the same plan.

The final management plan uses adaptive management to phase in greater tolerance of bison outside Yellowstone during the next five years. Some bison would be tolerated on public lands during winter, up to 100 along the park's north boundary near Reese Creek and up to 100 along the west boundary of the park. The spring bison population limit would be approximately 3,000 animals and bison would be vaccinated once a safe and effective vaccine is available. Cattle would be vaccinated and monitored in specific areas near Yellowstone National Park. Techniques for bison management could include additional monitoring of bison on public lands outside the park, hazing onto appropriate public lands or back into the park in the spring to avoid lethal removal, and control on public lands outside the park through capture and slaughter or agency shooting. The plan also includes provisions for continued research.

Both state and federal officials describe the plan as being "test driven" and open to refinement as managers and scientists learn more about brucellosis and managing the bison and cattle.

NPS objectives in the Final EIS and Bison Management Plan:

- Maintain genetic integrity of the bison population.
- Maintain a wild, free-ranging bison population.
- Maintain and preserve the ecological function that bison provide in the Yellowstone area, such as their role as grassland grazers and as a source of food for scavengers.
- Reduce risk of brucellosis transmission from bison to cattle.

Other Management Efforts

NPS participates in the Greater Yellowstone Interagency Brucellosis Committee (GYIBC), whose goal is to "protect and sustain the existing free-ranging elk and bison populations in the Greater Yellowstone Area (GYA) and protect the public interests and economic viability of the livestock industry in Wyoming, Montana and Idaho." The mission is to develop and implement brucellosis management plans for elk and bison. Objectives include maintaining viable elk and bison populations; maintaining the brucellosis-free status of Wyoming, Montana, and Idaho; aggressively seeking public involvement in the decision making process; and planning for the elimination of *Brucella abortus* from the Yellowstone area by the year 2010.

NPS was involved in a Natural Resources Preservation Program (NRPP) project that began research and collection of data on bison ecology and how *Brucella abortus* survives and functions in a wild environment. This project involved Grand Teton and Yellowstone national parks, and the information gathered from the research will help managers make sound defensible decisions for the future management of bison and elk in the two parks.

The National Park Service is also working with the Biological Resources Division of the U.S. Geological Survey in an ongoing research effort to examine the ecology and carrying capacity of bison in Yellowstone National Park.Preliminary results about bison movement in the park suggest that the animals do not travel on groomed roads as much as expected, but tend to follow rivers and other natural corridors.

More results for the various research projects are expected in 2002.

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Issues: Fisheries, Lake Trout

The Issue
Non-native lake trout have been found in Yellowstone Lake and threaten the survival of Yellowstone cutthroat trout and other species that depend on the native trout.

History/Background
- During the time that the park stocked fish, lake trout were introduced to Lewis and Shoshone lakes.
- In 1994, an angler caught the first verified lake trout in Yellowstone Lake.
- No one knows how lake trout were introduced into Yellowstone Lake, but it probably occurred 10–30 years ago.
- One lake trout can consume up approximately 50–60 cutthroat trout per year.
- If no action is taken, cutthroat trout in Yellowstone Lake would likely decline by 50% in 20–50 years.
- Many wildlife species, including the grizzly bear and bald eagle, may depend on the cutthroat trout for a portion of their diet.
- Lake trout are not a substitute food because they live at much greater depths than cutthroat trout and spawn in the lake rather than in shallow tributaries.

Current Status
- The fisheries staff is removing lake trout by gill-netting: more than 27,000 lake trout have been removed this way since 1994 (almost 13,000 in 2000 alone).
- Regulations encourage anglers to catch lake trout; 1,500 per year are caught.
- Biologists are researching the abundance and distribution of lake trout in Yellowstone Lake.
- With continued aggressive control efforts, lake trout numbers can be reduced and the impacts to cutthroat trout lessened.

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During the late 1880s when the Army administered Yellowstone National Park, the U.S. Fish Commission (a predecessor of today's U.S. Fish and Wildlife Service) was invited to stock non-native fish in some of the park's waters. Lake trout (also called Mackinaw) were brought from their native Great Lakes and planted in Lewis Lake.

Lake trout were never stocked in Yellowstone Lake, which had a healthy population of Yellowstone cutthroat trout. However, on July 29, 1994, a young girl fishing on Yellowstone Lake reeled in a fish that was a lake trout. The species must have been introduced—there is no natural way for lake trout to have gotten into the lake.

The lake trout is a large and aggressive predatory fish that has decimated cutthroat trout in other western waters. If its population is not controlled in Yellowstone Lake, the impacts will reach far beyond the cutthroat trout population. Some people believe it will be an ecological disaster.

In early 1995, a group of experts convened to review the situation, exchange information, and make recommendations. They recommended gill-netting for lake trout at areas of steep drop-offs where lake trout are thought to concentrate.

Netting Lake Trout

Lake trout gill-netting begins in late May or early June after ice is gone from the lake, and continues into October. Three different netting strategies are employed: control, distribution, and spawning. Control netting is primarily comprised of small-mesh (less than two-inch) gill nets strategically placed to capture large lake trout while minimizing both cutthroat trout bycatch and resource effort. Distribution netting means nets are set throughout the lake to monitor the distribution of both adult and immature lake trout. Both large- and small-mesh nets are used to capture all sizes of lake trout. Distribution netting has shown that most adult lake trout are in the West Thumb Basin and Breeze Channel areas. Spawning net strategy targets spawning grounds during the late fall spawn.

Since lake trout control operations began in 1994, more than 27,000 lake trout have been caught. Gill net operations not only remove lake trout from Yellowstone Lake, but also provide valuable population data on this non-native species. Information on population size, age structure, maturity, and potential new spawning areas all lead to more effective control of this species. For example, during 1996, a lake trout spawning area was discovered in the West Thumb region of Yellowstone Lake at Carrington Island. Scientists radio-tagged and released fish here to learn more about lake trout movements and to locate other spawning areas. Subsequently, a second spawning

area was found in West Thumb between Breeze Point and the mouth of Solution Creek. Hydroacoustic work (using sonar-based fish finders) done in 1997 confirmed lake trout were concentrated in the western portion of Yellowstone Lake. These surveys also revealed medium-sized (12–16 inches) lake trout tended to reside in deep water (greater than 130 feet). This finding was important because this is deeper than the Yellowstone cutthroat reside and now scientists can more easily target lake trout without harming cutthroat trout. Hydroacoustic data also provides actual abundance estimates of both cutthroat and lake trout, which is invaluable information for long-term evaluation of our efforts.

Anglers are also an important component in the lake trout management program. They have had the most success in catching lake trout that are between 15 and 24 inches long. These fish are found in shallow, near-shore waters in June and early July. To date, anglers have taken approximately 4–5 percent of the lake trout removed from Yellowstone Lake. Fishing regulations require anglers to kill all lake trout caught in Yellowstone Lake and its tributaries. In 2001, regulations were further refined to restrict all cutthroat trout fishing to catch-and-release only.

About 80 percent of a lake trout's diet consists of cutthroat trout. Based on lake trout predation studies in Yellowstone Lake, fisheries biologists estimate that approximately 50 to 60 cutthroat trout are saved for every lake trout caught.

Lake trout cannot be eliminated from Yellowstone Lake. However, ongoing management of the problem can control lake trout population growth, maintain the cutthroat trout population, and, thus, maintain this incredible ecological link between Yellowstone Lake and its surrounding landscape.

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Lake trout caught in gill nets (above); two lake trout held up by a fisheries biologist (left).

The Role of the Cutthroat Trout

Cutthroat trout may be an important food source for more than 40 species of animals in the ecosystem, including osprey, pelicans, river otters, and the threatened bald eagle and grizzly bear. Native Yellowstone cutthroat trout are easily available to predators because they spend the majority of their lives at or near the surface of the water in the lake. Cutthroat trout also spawn in the lake's tributaries in the spring. Grizzly bears seek this high-protein food. Lake trout are not available as prey because they spend most of their lives in deep water.

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Issues: Fisheries, Whirling Disease

The Issue
Whirling disease is caused by a parasite that attacks the developing cartilage of young fish, resulting in skeletal deformities and may cause a whirling behavior. Affected fish cannot feed normally and are extremely vulnerable to predation.

History/Background
- The disease was first described in Europe more than 100 years ago. It was detected in the U.S. in the mid 1950s.
- It most likely came to the U.S. in frozen fish products.
- Whirling disease has been confirmed in 20 states and appears to be rapidly spreading throughout the western United States.
- In fall of 1998, whirling disease was detected in cutthroat trout in Yellowstone Lake; in 2000, the parasite was found in the Firehole River.
- Rainbow trout populations appear to be most susceptible to the disease; recent laboratory tests suggests that cutthroat trout are also susceptible. Lake trout appear immune to the disease, and brown trout are highly resistant, but can be infected and can carry the parasite.
- There is no treatment for the disease.

Current Status
- Testing for whirling disease continues throughout the park.
- Education efforts are ongoing to inform the public how to help prevent the spread of the disease by thoroughly cleaning mud and aquatic plants from all equipment, clothes, and gear before moving to another body of water or watershed; and by not transporting fish between drainages.

The Madison River in western Montana has long been considered a stable, world-class trout fishery. However, beginning in 1991, studies in a section of the river outside Yellowstone National Park indicated this was changing. The population of rainbow trout in the study section was declining dramatically. Testing completed in late 1994 confirmed the presence of whirling disease, which scientists believe is one of the factors in the decline.

Whirling disease is caused by a microscopic parasite that can infect trout and salmon; it does not infect humans. The parasite attacks the developing cartilage of fish between 1–6 months old and causes deformities of the bony structures. An infected fish may have a deformed head and tail, blackened areas of the tail, and whirling swimming behavior. It may be unable to feed normally and is vulnerable to predation.

State-to-state transmission has often been attributed to the transport of hatchery fish. More recently, rigorous testing and strict policies have targeted both state and private hatcheries to reduce this threat. Little information exists on how the parasite moves from one drainage to another in the wild.

In Montana, in addition to the Madison River, the disease has been found in the Gallatin and Yellowstone rivers. A Whirling Disease Task Force has been formed to find solutions to the problem. In a June 1996 report, the task force stated that whirling disease is “the most significant threat to wild, native and nonnative naturally reproducing trout populations in Montana.” The report went on to state, “the relevant question appears no longer to be if whirling disease will spread, but how long it will take to happen.” The task force has recommended an aggressive program of research, management, communication, and education in an effort to find workable solutions to protect, preserve, and restore self-sustaining native wild trout populations in Montana.

In Yellowstone National Park, multi-year surveys for whirling disease have been completed for variety of sites, including Soda Butte Creek and the Bechler, Firehole, Gibbon, Gallatin, and Gardner rivers; all except the Firehole have tested negative for the parasite. Whirling disease is also present in Yellowstone Lake.

No effective treatment exists for wild trout infected with this disease or for the waters containing infected fish. Therefore, anyone participating in water-related activities, including anglers, boaters, or swimmers, are encouraged to take steps to help prevent the spread of the disease. This includes thoroughly cleaning mud and aquatic vegetation from all equipment and inspecting footwear before moving to another drainage. Anglers should not transport fish between drainages and should clean fish in the body of water where they were caught.

6

Issues: Grizzly Recovery Plan

The Issue
The grizzly bear is listed as a threatened species; the management goal is to recover the species to self-sustaining, viable population that no longer needs protection.

History/Background
- Debates on grizzly recovery center on variations of two points of view:

1. The animal is doomed to extinction.
2. The population has recovered and should removed from the threatened and endangered list.

- The current population is estimated to be 280–610 animals.
- Habitat loss and development on land outside the park continue to threaten the survival of the grizzly bear.
- 40–80 radio-collared grizzlies are monitored to track population trends and habitat use.
- The Draft Conservation Strategy has been released for public comment. See the next section for more information.

Current Status
- Three goals must be achieved before the grizzly bear population is considered recovered:

1. To have an average of 15 adult females with cubs of the year on a 6-year running average inside the recovery zone and within a 10-mile area surrounding the recovery zone.
2. To have 16 of 18 recovery zone Bear Management Areas occupied by females with young from a running 6-year sum of observations; no two adjacent areas shall be unoccupied.
3. To have the known human-caused mortality below 4 percent of the population estimate based on the most recent three-year sum of females with cubs minus known, adult female deaths. In addition, no more than 30 percent of the known human-caused mortality shall be females. These mortality limits cannot be exceeded during any two consecutive years.

- The goals were met in 1994, 1998, 1999, and 2000; they were not met in 1995,1996, and 1997.

On July 28, 1975, under the authority of the Endangered Species Act (ESA), the U.S. Fish and Wildlife Service listed the grizzly bear as a threatened species. A primary goal of the ESA is to recover threatened or endangered species to self-sustaining, viable populations that no longer need protection. As part of this goal, recovery parameters for the grizzly bear were established in the 1993 Grizzly Bear Recovery Plan. Under this plan, three population recovery goals must be achieved before the grizzly bear is considered recovered.

Parameter 1: Females With Cubs

Adult female grizzly bears with cubs-of-the-year (COY) are the most reliable segment of the population to count. Since 1975, 300 grizzly bears have been radio-marked. Using aerial and ground observations by reliable observers (determined by the leader of the Interagency Grizzly Bear Study Team [IGBST], and a committee of agency biologists), a minimum number of unduplicated females with cubs is recorded each year. The number of cubs per litter and pelage color combinations of different family groups (and the presence of radio-collars marking some individual bears) aid in identifying individual adult females. Adult female grizzly bears in the Yellowstone ecosystem generally have a three-year breeding interval. Therefore, the number of different females with COY counted over a three-year period gives an estimate of the number of adult females in the population.

Recovery Goal: To have an average of 15 adult females with COY on a 6-year running average both inside the recovery zone and within a 10-mile area immediately surrounding the recovery zone.

Rationale: The purpose of this goal is to estimate an average minimum population size and to demonstrate that a known minimum number of adult females are alive so that reproduction is sufficient to sustain existing levels of human-caused bear mortality in the ecosystem. The target number of 15 unduplicated females with COY must be attained as a running 6-year average. A running six-year average accounts for two breeding cycles and will allow at least two years when each live adult female can be reported with cubs. The 6-year average number of unduplicated females with cubs is not intended to determine precise population size or trend but to derive a minimum population estimate.

Current Status: The annual average number of unduplicated females with COY (1994–1999, 6-year average) is 28. This recovery goal is currently being achieved.

In addition to these three biological goals, habitat-based recovery parameters must be established and there must be a demonstration that "adequate regulatory mechanisms" are in place to ensure conservation of the species if and when it should be removed from the special protections granted by the ESA. (See next section for information on the conservation strategy.) When all these goals have been met, the grizzly bear may be considered for delisting from its threatened status.

Parameter 2: Distribution of Females With Cubs

To monitor grizzly bear population trends and to analyze the consequences of human activities and development on bears, grizzly bear habitat within the recovery zone has been divided into 18 habitat units called Bear Management Units (BMUs). Ideally, each unit should contain complete spring, summer, and fall habitat for grizzly bears. For most of the units, there is substantial evidence that the habitat contains adequate food sources to support grizzly bears in these three seasons.

Recovery Goal: To have 16 of 18 BMUs occupied by females with young from a running 6-year sum of observations, and no two adjacent BMUs shall be unoccupied. Occupancy requires verified evidence (sightings or tracks) of at least one female with young (COY, yearling, or two-year-old) at least once in each of 16 BMUs during a 6-year period.

Rationale: The purpose of this parameter is to demonstrate an adequate distribution of reproductive females within the recovery zone. Adult female grizzlies have a strong affinity for their home range. Distribution of family groups of bears indicates a likelihood of continued occupancy of each BMU, because grizzly bear offspring, especially females, tend to occupy habitat within or near the home range of their mother after being weaned. This parameter assumes that successful reproduction is an indicator of sufficient habitat being available to bears and provides evidence that available habitat is being managed adequately.

Current Status: From 1994 through 1998 (6-year running sum), all 18 BMUs were occupied at least once with family groups. This recovery goal is currently being achieved.

Parameter 3: Mortality

The rate of human-caused grizzly bear mortality, especially of adult females, is a key factor influencing the potential recovery of the population in the Yellowstone ecosystem. Known human-caused mortalities in excess of the level sustainable at a given number of females with cubs could result in population decline, while mortalities below this level would likely result in population increase.

Recovery Goal: The known human-caused mortality shall not exceed 4 percent of the population estimate based on the most recent three-year sum of females with cubs minus known, adult female deaths. In addition, no more than 30 percent of the known human-caused mortality shall be females. These mortality limits cannot be exceeded during any two consecutive years for recovery to be achieved.

Rationale: The level of sustainable mortality is directly related to the number of females with cubs. Grizzly bear populations probably can sustain 6 percent human-caused mortality without population decline. To facilitate recovery and account for unknown, unreported, human-caused mortality, the mortality goal is set at no more than 4 percent of the minimum population estimate, with no more than 30 percent of this mortality being females. The most recent 3-year sum of unduplicated females with cubs is used to calculate a minimum population estimate. This method applies the proportion of adult females in a population to the minimum number of adult females known to be alive. Mortality limits are recalculated annually based on population monitoring.

Current Status: The allowable, known human-caused mortality limit for 1999 was 14 bears (4 percent of the population estimate of 348 bears). The annual average of known, human-caused grizzly bear deaths (1994–1999) was 8 bears per year or two percent of the present minimum population estimate of 348 bears. This total mortality goal was achieved. The allowable human-caused mortality of adult females for the period was 4 bears (30 percent of the total allowable of 14). The 6-year average of annual, known human-caused female mortality was 3 female bears per year. This portion of the mortality goal is currently being achieved.

6

Issues: Grizzly Conservation Strategy

The Issue
If the threatened grizzly bear is delisted, a conservation strategy would ensure that population and habitat parameters continue to be achieved.

History/Background
- A team of biologists and managers from the USFS, NPS, USFWS and the states of Idaho, Wyoming, and Montana completed the Draft Conservation Strategy for the Grizzly Bear in the Yellowstone Ecosystem in March 2000.
- Public meetings were held in the three surrounding states (Montana, Wyoming, and Idaho) to obtain comments on the strategy.
- 16,794 public comments were received.
- The strategy contains population and habitat triggers that initiate relisting of the species if the population or habitat fall below certain threshold levels.
- The strategy plans to secure habitat and to monitor:

1. changes in genetic diversity in the Yellowstone grizzly population
2. four major food sources (cutthroat trout, army cutworm moths, ungulate carcasses, and whitebark pine cones)
3. bear predation of livestock
4. development of private land inside the recovery area
5. numbers of elk hunters and hunter-related bear deaths
6. cub production, mortality, and distribution

Current Status
The team is writing responses to significant comments.

The Strategy's Role in Recovery

Habitat-based recovery criteria and a conservation strategy define measures needed to ensure that the Yellowstone grizzly bear population remains at or above the recovery levels described in the Recovery Plan (previous section). They also demonstrate and reaffirm the commitment of the state and federal agencies to continue maintaining the Yellowstone grizzly bear and its habitat.

The conservation strategy is the primary long-term guide for managing and monitoring the grizzly bear population and assuring sufficient habitat to maintain recovery. It emphasizes the importance of continued coordination and cooperative working relationships among management agencies, landowners, and the public to ensure public support, continue application of best scientific principles, and maintain effective actions to benefit the continued coexistence of grizzlies and humans in the ecosystem. It incorporates existing laws, regulations, policies, and goals such as those already outlined in the Grizzly Bear Recovery Plan.

Flexibility In the Strategy

Under the proposed strategy, management of the grizzly and its habitat would have increased flexibility in several key areas:

- The existing recovery zone would be a Primary Conservation Area (PCA) in which grizzly/human conflict management and bear habitat management would be high priorities. Decisions would favor the bear population when grizzly habitat and other land uses are incompatible. In developed areas, grizzly bears will be actively discouraged and controlled.
- State wildlife agencies have primary responsibility to manage grizzly bears outside of national parks. National forests and parks will continue to manage habitat within their jurisdictions.
- The goal remains to sustain a grizzly bear population in the Greater Yellowstone Ecosystem, with an average of at least 15 unduplicated female bears with cubs distributed in 18 Bear Management Units (BMUs) across the ecosystem and with no more than 4 percent known mortality of bears on average. The goal is to maintain or improve habitat conditions for grizzly bears within the PCA.
- State and federal wildlife managers will continue to monitor the grizzly population and habitat conditions using the most feasible and accepted professional techniques. These include the maintenance of a marked (radio-collared) sample of bears and scientific methods to assess habitat conditions and changes on a broad geographic scale; this will require a long-term interagency commitment of professional wildlife biologists.
- Removal of nuisance bears will be conservative, consistent with mortality limits outlined above, and removal of female grizzly bears will be minimized. Managers will emphasize removal of the human cause of conflict rather than removal of a bear when possible.

- Managers will continue to meet periodically to share information, implement coordinated management actions, assure data collection, and identify research and financial needs across state and federal jurisdictions.
- Managers have more flexibility to manage nuisance grizzlies, particularly male bears. Bears may be relocated as many times as judged prudent by management authorities. However, no bears may be removed without at least one relocation unless involved in unnatural aggression toward humans.
- Management areas, previously used to delineate differences in land-management strategies, are eliminated. No distinction is made across the PCA as to management zones or "situation lines." Decisions affecting grizzly bears and/or their habitat would be made based on existing and future management plans incorporating input from biologists, other professional land managers, and affected publics.
- Outside the PCA and areas currently occupied by grizzly bears, state and federal land management plans will define where grizzly bear occupancy will be acceptable. These decisions will be made through planning processes that involve affected groups and individuals.

What Is Next

If the grizzly bear population goals outlined in the Grizzly Bear Recovery Plan continue to be met and habitat goals are established, consideration will be given to delisting the greater Yellowstone grizzly bear population. Completion of a conservation strategy does not in itself propose or accomplish a change in status of the grizzly bear population. The conservation strategy is a commitment by the responsible agencies to long-term management of grizzly bears and their habitat in ways that are compatible with human occupation and enjoyment of greater Yellowstone.

Management reviews will be conducted when conditions deviate from the desired long-term goals for the grizzly bear population and/or its habitat. If a change occurs in the protected status of the grizzly bear population, such reviews may result in a recommendation for a formal status review by the U.S. Fish and Wildlife Service. If and when conditions warrant, a delisted population could be relisted for protection under the Endangered Species Act.

Non-Debatable Topics

The Interagency Grizzly Bear Committee and the U.S. Fish and Wildlife Service view some of the topics discussed in the conservation strategy as non-debatable. These include:

- The continued population goal to have at least 15 unduplicated female bears with cubs distributed in 18 Bear Management Units (BMUs) across the ecosystem. Continuation of this requirement maintains a minimum level and distribution of grizzly bears that has allowed us to achieve the positive trend in the population as seen during the past decade.
- The size of the existing recovery zone, which would be managed as a Primary Conservation Area (PCA). The existing zone has been sufficient to achieve the population growth seen during the past decade.
- The legally established jurisdiction for wildlife management (primarily vested in the states, except on lands of exclusive federal jurisdiction such as Yellowstone National Park.)

However, public involvement will be important to managers as they finalize this statement of long-term management goals and guidelines. Topics on which public input is desired include:

- How should nuisance bears be managed to allow desired multiple land uses while meeting mortality goals necessary to maintain a healthy grizzly population?
- Where and under what conditions should grizzly bears be tolerated outside the existing recovery zone /PCA?
- How should habitat conditions needed to sustain a healthy grizzly bear population be monitored and maintained?
- How should the continued costs of monitoring and managing a grizzly bear population across the greater Yellowstone area be paid for?

6

Issues: Northern Range

The Issue

Some scientists believe the park has more ungulates (hoofed mammals) than the Northern Range can sustain. Elk,bison, and pronghorn are blamed for overgrazing, and for increased erosion and declines in willows, aspen, and beaver. Other scientists have found no evidence that the park's grasslands are overgrazed.

History/Background

- For decades, the park intensively managed elk, bison, and pronghorn.
- The park discontinued wildlife reductions in 1968 due to the growing belief that wildlife populations can self-regulate.
- In the 1970s and early 1980s, scientific and public concerns grew about the increasing population of ungulates on the Northern Range.
- In 1986, Congress mandated a major research initiative to answer these concerns. Results found that the Northern Range was healthy and that elk did not adversely effect the overall diversity of native animals and plants.
- The interaction of ungulates, climate, hydrology, beaver and aspen or woody shrubs like willows is equivocal and more scientific research is needed.

Current Status

- Despite scientific conclusions to the contrary, some people continue to claim that the Northern Range is overgrazed.
- In 1998, Congress called for the National Academy of Sciences to review management of the Northern Range. Results of the review are not yet available.
- In March 2000, in response to new controversy about the impact of wolves on the elk herds of the Northern Range, three independent researchers began a 5-year investigation of this elk population and the impact of wolf restoration.

The Northern Range refers to the broad sagebrush grassland that borders the Yellowstone and Lamar rivers in the northern quarter of the park. (See map next page.) This area sustains one of the largest and most diverse populations of free-roaming large animals seen anywhere on earth. Many of the park's ungulates spend the winter here. Elevations are lower and the area receives less snow than elsewhere in the park. Often the ridge tops and south-facing hillsides here are clear of snow, a result of wind as well as snowmelt during the many sunny winter days. Animals take advantage of this lack of snow, finding easy access to forage.

History

From the time the U.S. Army arrived in 1886 until the 1930s, wildlife management in Yellowstone was mainly seen as protecting the ungulates from poachers, natural predators, and other threats. Wildlife biology was in its infancy, and management practices encouraged the attitude that wildlife was either "good" or "bad." This view led to the elimination of many predators from most of the western United States, including Yellowstone. In the park, protection from predators caused an increase in ungulate numbers.

Early censuses of the elk in the park, especially on the Northern Range, are highly questionable. By the early 1930s, scientists and managers believed that grazing and drought in the early part of the century had reduced the range's carrying capacity and that twice as many elk were on the range in 1932 as existed there in 1914.

From 1935 to 1968, park rangers controlled elk, pronghorn, and bison numbers by shooting or trapping and removal. More than 13,500 elk were shipped out of the park to control their numbers and to repopulate areas where elk had been eliminated through over-harvesting and poaching.

By the 1960s, scientists and wildlife managers had begun to understand complex interconnections existed among and between living and non-living components of ecosystems. In Yellowstone, scientists suggested that ungulate populations could be self-regulating, and, as a result, wildlife reductions were discontinued in 1968.

Research Results

Studies of the Northern Range began in the 1960s and have continued to the present. These studies have revealed no clear evidence of overuse. In 1986, continuing concern over the condition of the Northern Range prompted Congress to mandate more studies. This research initiative, one of the largest in the history of NPS, encompassed more than 40 projects by NPS biologists, university researchers, and scientists from other federal and state agencies. Results found that the Northern Range was in good shape. Ungulate grazing actually enhances plant production in all but drought years.

Grazing also enhances protein content of grasses, yearly growth of big sagebrush, and seedling establishment of sagebrush. No reductions in root biomass or increase in dead bunchgrass clumps were observed. However, studies on aspen and willows and their relationship to ungulates on the Northern Range are not so clear-cut and are continuing. Despite these scientific results, the belief that elk grazing is damaging Northern Range vegetation and that grazing accelerates erosion persists among many people, including some scientists.

Continuing Controversy

In 1998, Congress again intervened in the controversy. It called for the National Academy of Sciences to review management of the Northern Range. This two-year study began in 1999. Another study began in March 2000 to investigate elk population responses to wolf restoration.

In part, the controversy is likely due to the personal or scientific background of each person. Many urban dwellers live among intensively managed surroundings (community parks and personal gardens and lawns) and are not used to viewing wild, natural ecosystems. Livestock managers and range scientists tend to view the landscape in terms of maximizing the number of animals that a unit of land can sustain. Range science has developed techniques that allow intensive human manipulation of the landscape for this goal, which is often economically based. Many ecologists and wilderness managers, on the other hand, have come to believe that the ecological carrying capacity of a landscape is different from the concept of range or economic carrying capacity. They believe that the only constant in a naturally functioning wilderness ecosystem is variability and change. What may look bad, in fact, may be normal.

Change on the Northern Range

During the 1990s, the ecological carrying capacity of the Northern Range increased as elk colonized new winter ranges north of the park that had been set aside for this purpose. Summers were also wet (resulting in better plant production) while winters were (generally) mild. The fires of 1988 also had opened many forest canopies, allowing more grasses to grow.

Many scientists believe that winter is the major factor influencing elk populations. Mild winters allow many more elk to survive until spring, but severe winters result in significant levels of winter kill for many animals, not just elk. In severe winters (like the winter of 1988–89 or 1996–97), up to 25 percent of the herd can die. The northern Yellowstone elk herd demonstrates the ecological principle of density-dependence: over-winter calf mortality, yearling mortality, and adult bull mortality all increase with higher elk population densities. Elk are also continuously subjected to predation by other species in the ecosystem, including bears, wolves, coyotes, and mountain lions. The complex interdependence of these relationships results in fluctuations in the elk population—when there are lots of elk, predator numbers increase, which, in part, helps to reduce elk numbers.

National Park Service policies not only protect native species but also protect the ecological processes that occur naturally across the landscape. Whenever possible, human intervention is discouraged. While controversy continues about the Northern Range and NPS management practices, a myriad of research projects continue in an effort to more accurately describe what is happening on Yellowstone's Northern Range.

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6

Issues: Winter Use

Winter use has increased dramatically from virtually none 30 years ago to more than 140,000 visits per season since the early 1990s. This winter use had received no systematic planning up until 1990. In that year, the National Park Service completed a Winter Use Plan for Yellowstone and Grand Teton national parks and the John D. Rockefeller, Jr. Memorial Parkway that included a commitment to establish a Visitor Use Management (VUM) process if winter visitation exceeded certain thresholds. That happened in 1992–1993, when winter use exceeded the projection for the year 2000 (140,000 visitors), and the VUM process began in 1994.

As part of the VUM process, scientific studies and visitor surveys were undertaken and analyzed. Letters were accepted during a public comment period, and a series of eight public meetings were held around the region from February through May 1996. Members of the public expressed concerns regarding a number of issues (see sidebar next page). An interagency planning team produced a draft report in the summer of 1997, *Winter Use Management: A Multi-Agency Assessment,* which was available for public comment in 1997 and approved for final publication in 1999.

Lawsuit Filed

During the harsh winter of 1996–97, more than 1,000 bison were shot or shipped to slaughter in addition to a large natural winter-kill. As a result, concern arose that groomed roads increased the number of bison leaving the park to be killed. In May 1997, the Fund for Animals and other organizations and individuals filed lawsuit in Washington, D.C., against NPS. The lawsuit identified three primary complaints:

- NPS had failed to prepare an environmental impact statement concerning winter use in Yellowstone and Grand Teton national parks and the Rockefeller Parkway
- NPS had failed to consult with the U.S. Fish and Wildlife Service on the effects of winter use on threatened and endangered species
- NPS had failed to evaluate the effects of trail grooming in the parks on wildlife and other park resources.

On October 27, 1997, the plaintiffs, the Department of Justice, and NPS signed a settlement agreement. Under the terms of this agreement, NPS agreed to prepare a new winter use plan and corresponding environmental impact statement, and to consult with the U.S. Fish and Wildlife Service on the effects of winter use on

The Issue

Winter recreation in Yellowstone National Park proceeded for 37 years without compliance with the applicable laws and executive orders relative to off-road vehicle use and, thus, with little thought about its appropriateness and impact on the ecosystem.

History

1949, winter: 35 visitors entered the park by snowplane
1955, winter: 507 entered by snowcoach
1963, winter: six snowmobiles entered the park.
1992, winter:visitation exceeded threshold of 140,000 people per year, which was projected in a 1990 winter-use plan.
1993: In accordance with the 1990 plan, a Visitor Use Management process began and resulted in an interagency evaluation of winter recreation in the Greater Yellowstone Area (GYA), completed in 1999.
1997: Fund for Animals files lawsuit; results in NPS signing an agreement requiring the development of a new winter use plan and EIS.
1999: The Draft Environmental Impact Statement (DEIS) was released in July; it received more than 48,000 public comments.
2000, October: The final EIS was released and received about 11,000 public comments.
2000, November: A Record of Decision was signed on the 22nd.
2001: The final rule was published in the Federal Register on January 22.

The Winter Use Plan

- The Winter Use Plan is for Yellowstone and Grand Teton national parks and John D. Rockefeller, Jr. Memorial Parkway.
- Its development involved 3 states, 5 counties, and the U.S. Forest Service as cooperating agencies.
- Extensive research supported the decision-making process: 32 projects were completed, of which 29 were independent.
- The Record of Decision calls for prohibiting recreational use of snowmobiles in the two national parks and the parkway in the winter of 2003–2004.
- The final rule, which was published in the Federal Register, provides for interim actions to be implemented to reduce the impacts of snowmobile use during the winter use season of 2002–2003; and effective at the end of the 2002–2003 winter use season, it allows for oversnow motorized recreation access by NPS-managed snowcoach only, with limited exceptions for continued snowmobile access to other public and private lands adjacent to or within Grand Teton National Park.

threatened and endangered species. NPS also agreed to immediately prepare an environmental assessment (EA) evaluating the effects of temporarily closing one or more segments of winter snowmobile road in Yellowstone to study wildlife movements on groomed roads within the park. (An environmental assessment was necessary because closing road segments within the park to grooming could potentially impact park visitors and, subsequently, local and regional economies.)

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The Environmental Assessment–Temporary Closure of a Winter Road, Yellowstone National Park was released to the public in October 1997. During the 45-day public comment period, the park received 2,742 letters. Of primary concern to members of the public were the negative and positive impacts of road grooming on bison, the negative and positive aspects of snowmobiling, and the importance of snowmobiling and winter use on local economies. About 500 letters contained comments addressing research concerns, suggesting a lack of scientific evidence existed to justify a temporary road closure.

Concerns Raised at Public Meetings

- overcrowding
- visitor impacts on natural resources
- noise and air pollution
- availability of facilities and services
- use restrictions
- user group conflicts
- importance of winter visitation to the local and regional economy
- wildlife use of groomed surfaces
- wildlife displacement
- health and human safety

After completing analysis of the comments in January 1998, Yellowstone National Park officials decided a road closure would not be put into effect in the winter of 1997–98 nor during the next two winters. The rationale was the lack of scientific evidence that clearly showed a road closure was necessary. To answer these questions, NPS identified several areas of additional research. During the next three winters, biologists would research and monitor wildlife movements (particularly bison) in the Gibbon, Firehole, and Madison river areas and Hayden Valley. Monitoring of other road segments to determine seasonal use by bison and the significance of that use in bison population movements and dynamics would also be conducted. The following are complete: four years of monitoring in Hayden Valley plus three years on the west side and one research project.

Another Lawsuit

On February 18, 1998, the Fund for Animals and other organizations filed suit against the National Park Service alleging that NPS did not have the necessary data to make the decision to defer closing a road segment in the park. In addition, the plaintiffs alleged that the unlimited road grooming and the alleged lack of winter use management practices are continuing to harm the plaintiffs' short- and long-term interests in recreating and in protecting and observing and studying the environment and wildlife in the park. On March 31, 1999, the U.S. District Court for the District of Columbia ruled in favor of NPS. The court found that the park's decision to not close one or more segments of groomed road during the next three years did not violate the October 1997 settlement agreement and that the park had presented an adequate range of alternatives in the EA as required under the law.

Planning Continued

Meanwhile, planning for a new winter use plan and environmental impact statement began in early 1998. The purpose of this plan is to provide future winter visitors to the parks with a range of quality winter experiences and settings from primitive to developed. These recreational experiences must be offered in an appropriate location or setting that does not impact sensitive natural resources, wildlife, cultural areas, or the experiences of other park visitors. In order to ensure the safety of all park visitors and employees, conflicts between different types of user groups and conflicts with wildlife must be minimized. Finally, winter recreation within Yellowstone and Grand Teton national parks and the John D. Rockefeller, Jr. Memorial Parkway should complement the unique aspects of each landscape within the ecosystem.

While Yellowstone and Grand Teton national parks and the John D. Rockefeller, Jr. Memorial Parkway were the lead agencies preparing the document, nine cooperating agencies joined the effort: the U.S. Forest Service, the states of Idaho, Montana, and Wyoming; and the counties of Gallatin and Park, Montana, and Park and Teton, Wyoming, and Fremont, Idaho. To develop the scope of the winter use plan, scoping brochures were mailed to about 6,000 inter-

ested parties, 12 public meetings were held in the greater Yellowstone area, 4 public meetings were held in other parts of the country, and about 2,000 public comments were considered.

In July 1999, NPS published a draft EIS for public comment. The alternatives addressed the issues of visitor access, sound, emissions, wildlife concerns, and affordability. The preferred alternative called for, among other things, plowing the road from West Yellowstone to Old Faithful and allowing snowmobile use on other park roads. Five public hearings were held in the region, and one in Colorado. More than 48,000 public comments were received.

Looking At Snowmobiles System-wide

Separately, in January 1999, the Bluewater Network and some 60 other conservation organizations requested that NPS begin immediate rulemaking to prohibit snowmobile use within the 44 units of the National Park System in which it is allowed, including Yellowstone, Grand Teton, and the Parkway. That petition prompted an agency review of policies and practices on snowmobile use in parks. As part of that review, NPS conducted a survey of parks in which snowmobile use is currently allowed. The survey gathered information from each relevant park on such matters as the basis for the original decision to allow snowmobile use in that park; extent of that use; what is known about the impacts of that use on park resources and values, including the enjoyment of other visitors; and what monitoring is conducted to determine impacts.

NPS also held a two-day snowmobile summit in February 2000 at which officials from the DOI (including the Office of the Solicitor) and NPS (including all but one of the 44 affected parks) reviewed the snowmobile use now occurring in the National Park System. The officials learned through the survey and the snowmobile summit that much of the snowmobile use in the national park system is not consistent with management objectives or the protection of park resources and values and is not in compliance with the requirements of the two executive orders and NPS general regulations on snowmobile use.

In March 2000, NPS met with the cooperators on the plan (state and county representatives) to review public comments, studies and additional information gathered since preparation of the draft EIS. NPS indicated a tentative direction for a preferred alternative for the final EIS that would move towards using snowcoaches as the only mechanized means to access the interior of Yellowstone. The Environmental Protection Agency stated that based on impacts to human health, air quality, water quality and visibility, this alternative (snowcoach only) was the "environmentally preferred alternative."

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In April 2000, the Department of Interior and NPS announced an intention to propose changes in the snowmobile use allowed in all national parks to protect park resources and values, to meet management objectives for the parks, and to come into compliance with the legal requirements applying to that use.

Finalizing Yellowstone's Winter Use Plan

During the next ten months, the Winter Use Plan was finalized. The final EIS was released in October 2000. Although there was no requirement for public review, commitments were made to the cooperating agencies that there would be a public comment period. About 11,000 public comments were received. A Record of Decision was signed on November 22; it calls for prohibition of recreational use of snowmobiles in Yellowstone and Grand Teton national parks and the Parkway in the winter of 2003–2004. On December 18, draft regulations were published in the Federal Register to amend rules for snowmobile use in Grand Teton, Yellowstone, and the Parkway and thus implement the Record of Decision. The regulations were available for comment until January 17, 2001, and more than 5,200 public comments were received.

On January 22, 2001, the final rule was published in the Federal Register. The rule provides for interim actions to be implemented to reduce the impacts of snowmobile use during the winter use season of 2002–2003; and effective at the end of the 2002–2003 winter use season, it allows for oversnow motorized recreation access by NPS-managed snowcoach only, with limited exceptions for snowmobile access to other public and private lands adjacent to or within Grand Teton National Park. The rule went into effect April 22, 2001.

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NPS is testing new multi-season vehicles, such as this van on treads.

Implementing the Plan

Several actions are being taken to implement the plan. For winter 2000–2001, NPS allowed existing snowcoach and snowmobile outfitters to add snowcoaches to their fleet. NPS is preparing a new prospectus for new snowcoach contracts. NPS has also partnered with the U.S. Department of Energy through their Idaho Operation Office (the Idaho National Engineering and Environmental Laboratory, INEEL) to conduct an evaluation of vehicles for all seasons and to develop alternative fueled vehicles. INEEL is in the process of selecting one of the six companies interested in developing a prototype of a new snowcoach. Also, the Yellowstone National Park has begun working with its neighbors to develop a marketing strategy for visiting Yellowstone by snowcoach.

Legal Framework for Snowmobiles in National Parks

National Park Service Act of 1916: To conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same and by such means as will leave them unimpaired for the enjoyment of future generations.

NPS Management Policies—2001: Impairment is an impact that, in the professional judgement of the responsible NPS manager, would harm the integrity of the park resources or values, including the opportunities that would otherwise be present for the enjoyment of those resources and values.

General Authorities Act—1978: The authorization of activities shall be construed and the protection,management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided for by Congress.

National Parks and Recreation Act—1978: Directs that management plans be prepared for all units of the National Park System that include, but are not limited to: (3) identification of and implementation commitments for visitor carrying capacities for all areas of the unit.

Clean Air Act: Section 160 states one of the purposes of the act is "to preserve, protect,and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural,recreational, scenic, or historic value."

Section 162 mandates the designation of national park areas greater than 6,000 acres and wilderness areas greater than 5,000 acres as Class I. Yellowstone and Grand Teton national parks are mandatory Class I areas.

Section 169(A) states that "Congress hereby declares as a national goal the prevention of any future, and the remedying of any existing impairment of visibility in mandatory Class I Federal areas which impairment results from any manmade air pollution."

E.O. 11644—2/8/72 (President Nixon) "Use of Off-Road Vehicles on the Public Lands:" Areas and trails shall be located in areas of the National Park System only if the respective agency head determines that off-road vehicle use in such locations will not adversely affect their natural, esthetic or scenic values.

E.O. 11989—5/24/77 (President Carter): The respective agency head shall, whenever he determines that the use of off-road vehicles will cause or is causing considerable adverse effects on the soil, vegetation, wildlife,wildlife habitat or cultural or historic resources of the particular areas or trails of the public lands, immediately close such areas or trails to the type of off-road vehicle causing such effects, until such time as he determines that such adverse effects have been eliminated and that measures have been implemented to prevent future recurrences.

DOI prepared an EIS in 1976—Departmental Implementation of Executive Order 11644, as amended by E.O. 11989, pertaining to use of off-road vehicles on the public lands: Clearly defines use of snowmobiles on roads as off-road vehicles.

36 CFR 2.18: The use of snowmobiles is prohibited, except where designated and only when their use is consistent with the park's natural, cultural, scenic, and esthetic values, safety considerations, park management objectives, and will not disturb wildlife and damage park resources.

Consolidated Appropriation Act—2001, Section 128: None of the funds provided in this or any other Act may be used prior to July 31, 2001, to promulgate or enforce a final rule to reduce during the 2000–2001 or 2001–2002 winter seasons the use of snowmobiles below current use patters at a unit of the National Park System; Provided, That nothing in this section shall be interpreted as amending any requirement of the Clean Air Act: Provided further, That nothing in this section shall preclude the Secretary from taking emergency actions related to snowmobile use in any national park based on authorities which existed to permit such emergency actions as of the date of enactment of this Act.

6

Issues: Wolf Restoration

The gray wolf *(Canis lupus)* was present in Yellowstone when the park was established in 1872. Predator control, including poisoning, was practiced here in the late 1800s and early 1900s. Between 1914 and 1926, at least 136 wolves were killed in the park; by the 1940s, wolf packs were rarely reported. An intensive survey in 1978 found no evidence of a wolf population in Yellowstone, although an occasional wolf probably wandered into the area. A wolf-like canid was filmed in Hayden Valley in August 1992, and a wolf was shot just outside the park's southern boundary in September 1992. However, no verifiable evidence of a breeding pair of wolves existed. During the 1980s, wolves began to reestablish breeding packs in northwestern Montana; 50–60 wolves inhabited Montana in 1994.

Restoration Proposed

NPS policy calls for restoring native species when: a) sufficient habitat exists to support a self-perpetuating population, b) management can prevent serious threats to outside interests, c) the restored subspecies most nearly resembles the extirpated subspecies, and d) extirpation resulted from human activities.

The U.S. Fish & Wildlife Service (USFWS) *1987 Northern Rocky Mountain Wolf Recovery Plan* proposed reintroduction of an "experimental population" of wolves into Yellowstone. (An experimental population, under section 10(j) of the Endangered Species Act, is considered nonessential and allows more management flexibility.) Most scientists believed that wolves would not greatly reduce populations of mule deer, pronghorns, bighorn sheep, white-tailed deer, or bison; they might have minor effects on grizzly bears and cougars; and their presence might cause the decline of coyotes and increase of red foxes.

The Issue

The wolf is a major predator that had been missing from the Greater Yellowstone Ecosystem for decades until its restoration in 1995.

History

Late 1800s–early 1900s: predators, including wolves, were routinely killed in Yellowstone.

1926: The last wolf pack in Yellowstone was killed, although reports of single wolves continued.

1973: The gray wolf was listed as endangered; recovery is mandated under the Endangered Species Act

1975: The long process leading to wolf restoration in Yellowstone began.

1991: Congress appropriated money for an EIS for wolf recovery.

1994: EIS completed for wolf reintroduction in Yellowstone and central Idaho. More than 160,000 public comments were received—the largest number of public comments on any federal proposal.

1995 and 1996: 31 gray wolves from western Canada were relocated to Yellowstone.

1997: U.S. District Court judge ordered the removal of the reintroduced wolves in Yellowstone, but immediately stayed his order, pending appeal.

January 2000: The decision was reversed.

Current Status

- As of December 2000, almost 170 wolves live in 16 packs in the greater Yellowstone area; 8 of those packs with 126 individuals live in the park.
- Eighty-five documented wolf deaths have occurred since the beginning of reintroduction. More than half of the mortalities are human caused with the rest being natural. The leading natural cause of mortality is wolves killing other wolves.
- Livestock predation was expected to be 40–50 sheep and 10–12 cows per year, but has been much lower: 146 sheep, 14 cattle since 1995.
- A private non-profit group, Defenders of Wildlife,compensates livestock owners for the value of lost livestock.
- Research is underway to determine impact of wolf restoration on cougars, coyotes, and elk.

In 1991, Congress provided funds to the USFWS to prepare, in consultation with NPS and the U.S. Forest Service, an environmental impact statement (EIS) on restoration of wolves. In June 1994, after several years and a near-record number of public comments, the Secretary of the Interior signed the Record of Decision for the final EIS for reintroduction of gray wolves to Yellowstone National Park and central Idaho.

Once wolf management plans (based on federal guidelines) are completed and approved for each state, the states and tribes will implement and lead wolf management programs outside the boundaries of national parks and wildlife refuges. Until then, the USFWS continues to manage the wolf restoration program.

See Chapter 3 for wolf natural history and pack locations.

Staff from Yellowstone, the USFWS, and participating states prepared for wolf restoration to the park and central Idaho. The USFWS prepared special regulations outlining how wolves would be managed as an experimental population.

Park staff completed site planning and archaeological and sensitive plant surveys for three sites in the Lamar Valley that would be used in 1994–95. Later, additional sites—Blacktail Plateau, Nez Perce Creek, Fishing Bridge, Trail Creek—were prepared for potential use in 1995–97.

Each release site was approximately 1 acre enclosed with 9-gauge chain-link fence in 10 x 10 foot panels. The fences had a two-foot overhang and a four-foot skirt at the bottom to discourage climbing over or digging under the enclosure. Each pen had a small holding area attached to allow a wolf to be separated from the group if necessary (i.e., for medical treatment). Plywood boxes provided shelter if the wolves desired isolation from each other. These enclosures were built to be dismantled and reconstructed at other sites, if necessary, in future years.

Relocation & Release

In late 1994/early 1995, and again in 1996, USFWS and Canadian wildlife biologists captured wolves in Canada and relocated and released them in both Yellowstone and central Idaho. In mid January 1995, 14 wolves were temporarily penned in Yellowstone; the first 8 wolves on January 12 and the second 6 on January 19, 1995. Wolves from one social group were together in each release pen. On January 23, 1996, 11 more gray wolves were brought to Yellowstone to launch the second year of wolf restoration. Four days later they were joined by another 6 wolves. The wolves ranged from 72 to 130 pounds in size and from approximately nine months to five years in age. They included wolves known to have fed on bison. Groups included breeding adults and younger wolves from one to two years old.

Each wolf was radio-collared as it was captured in Canada. While temporarily penned, the wolves experienced minimal human contact. Approximately once a week, they were fed elk, deer, moose, or bison that had died in and around the park. They were guarded by law enforcement rangers who minimized the amount of visual contact between wolves and humans. The pen sites and surrounding areas were closed to visitation and marked to prevent unauthorized entry. Biologists checked on the welfare of wolves several times each week, using telemetry or visual observation while placing food in the pens. Due to the early success of reintroductions, no transplants occurred after 1996.

Some people expressed concern about wolves becoming habituated to humans while in captivity. However, wolves typically avoid human contact, and they seldom develop habituated behaviors such as scavenging in garbage. Captivity was also a negative experience for them and reinforced their dislike of humans.

Lawsuits

Several lawsuits were filed to stop the restoration on a variety of grounds. These suits were consolidated, and in December 1997, the judge found that the wolf reintroduction program in Yellowstone and central Idaho violated the intent of section 10(j) of the Endangered Species Act because there was a lack of geographic separation between fully protected wolves already existing in Montana and the reintroduction areas in which special rules for wolf management apply. The judge wrote that he had reached his decision "with utmost reluctance." He ordered the removal (and specifically not the killing) of reintroduced wolves and their offspring from the Yellowstone and central Idaho experimental population areas, but immediately stayed his order pending appeal. The Justice Department appealed the case, and in January 2000 the decision was reversed.

Results of the Restoration

The return of wolves has already had significant beneficial impacts to the Yellowstone ecosystem. Wolves have preyed primarily on elk and these carcasses have provided food to a wide variety of other animals, especially scavenging species. Grizzly bears have usurped wolf-kills almost at will, a finding contrary to predictions and observations from other areas where the two occur. Coyote populations have declined inside wolf territories, a finding that may benefit other smaller predators, rodents, and birds of prey. Preliminary data from studies indicate that wolf recovery will likely lead to greater biodiversity throughout the Greater Yellowstone Ecosystem.

6

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All Issues

For current information on issues in Yellowstone National Park, check the official park website: www.nps.gov/yell